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ANIMAL HUSBANDRY DIVISION  
HAWAII AGRICULTURAL EXPERIMENT STATION  
HONOLULU, HAWAII

Under the joint supervision of the  
UNIVERSITY OF HAWAII  
and the  
UNITED STATES DEPARTMENT OF AGRICULTURE

Progress Notes on Experiments and Other Items of Interest

No. 8

January, 1935

These progress notes on experimental work and other items of interest to livestock men in the Territory are issued from time to time by the Animal Husbandry Division. You are invited to suggest other lines of research that you deem important and to submit inquiries to the University.

GREEN PANICUM GRASS VS. GREEN SUDAN  
GRASS FOR DAIRY COWS

By L. A. Henke<sup>1</sup>

Animal Husbandman, Hawaii Agricultural Experiment Station.

Introduction

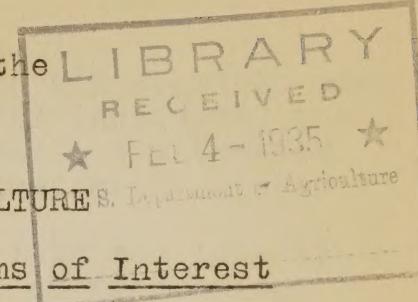
Panicum grass<sup>2</sup>, also known as Para grass and in some sections as California grass, is widely scattered over Oahu and to a lesser extent over the other Islands of the Territory. It grows best in low wet places and covers many such areas as a volunteer growth. Pineapple plantations have used this grass as a rotation crop between cycles of pineapple crops. In recent years many dairymen having suitable land have planted Panicum grass in fields formerly planted to old Sudan or some other grass. Other dairymen lacking land drive long distances to gulches where this grass grows, cut same with a grass sickle, and haul it to their dairies. As this grass is largely used to replace Sudan grass, it seemed that some experimental work on the relative value of these two roughages for dairy cattle seemed desirable.

Plan of Experiments

In these experiments the roughages were cut and fed to the cattle in feed racks in the two small pastures (36 x 200 feet) where the cattle were confined except during the milking hours. The roughages were weighed for each lot before being put in the feed racks and unconsumed roughages were weighed back. The cows in each lot were given as much of the respective roughages as they would consume.

<sup>1</sup>The valuable help of G.W.H. Goo, Assistant in Animal Husbandry, in computing the data of these experiments is acknowledged.

<sup>2</sup>Panicum barbinode.





Two experiments were conducted--the first with six Holstein cows for a nine-week period from March 30 to May 31, 1933 inclusive, the second with four Holstein and two Guernsey cows over a twelve-week period from September 28 to December 20, 1933 inclusive.

In each experiment the six cows were divided into two lots of three each. In dividing the cows breed, age, date of freshening, date due to calve, weight and production were considered and balanced as equally as possible between the two lots.

The double reversal system of feeding was followed. Lot A in each experiment was started on the Panicum grass and after three weeks (four weeks in the second experiment) was shifted to Sudan grass for roughage and again shifted back to Panicum grass for the last three- or four-week period of the nine-and twelve-week experiment respectively. Lot B in each experiment was started on Sudan grass and fed Panicum grass and Sudan grass respectively during the second and third periods of each experiment. In each experiment the first week of each period was used to accustom the cows to change of feed and only the last two and three weeks of each period of the respective experiments were used in computing results.

The mean of the first and last periods of each lot was compared with the second or middle period in order to compensate for decreasing production due to advancing lactation.

#### The Concentrate Feeds

Since both roughages used in these experiments are non-legumes and rather low in protein, a medium high protein concentrate mixture was fed to insure the cows getting ample protein. This mixture was as follows:

200 lbs.	soybean oil cake meal
480 "	wheat bran
300 "	rolled barley
12 "	raw rock phosphate
12 "	salt

This mixture supplied 16.6 percent digestible crude protein and 69.7 percent digestible total nutrients and cost \$24.20 per ton during the first experiment and \$28.60 during the second test.

Each cow in each experiment was fed two pounds of beet pulp daily in addition to the other concentrates and roughages.

The amount of concentrates given to each cow depended on her production so that during the first and second period of the experiment the cows received amounts that were adjusted with their production. But during the last period, the amounts of grain given were based on the amounts given during the first and second periods so that the average of the first and last period would equal the middle period.



Thus a cow that was fed 12 pounds and 11 pounds daily during the first and second periods was given 10 pounds during the last period. To have varied the concentrates would have introduced a quantity variable in the amount of grain fed--something we wished to avoid when comparing the value of different roughages.

Cows Used and Feeding Schedules

Experiment I

The cows in the first experiment were much further along in their lactation than was desirable with consequent low production, but since these were the only cows available at the time, it seemed best to use them for the first test for whatever information could be secured rather than delay the starting of the experiments.

Cow No.	'Breed'	Age	'Days since' 'calving to'		'Due to calve on March 7, 10, 19	'Daily production lbs.'
			3/30/33	369		
<u>Lot A</u>						
88	H	5½	369	8/24/33	24.2	
109	H	4	241	10/26/33	19.5	
113	H	3	222	---	19.8	
<u>Average</u>						
		4	277		21.2	
<u>Lot B</u>						
104	H	4	205	10/12/33	22.4	
105	H	4	190	10/12/33	21.5	
111	H	3	244	9/3/33	19.1	
<u>Average</u>						
		4	213		21.0	

Feeding Schedule

Cow Number	Lot A			Lot B		
	88	109	113	104	105	111
Inclusive days 1933						
Mar. 30 - Apr. 19	P	P	P	S	S	S
Apr. 20 - May 10	S	S	S	P	P	P
May 11 - May 31	P	P	P	S	S	S
June 1 - Returned to roughage fed previous to March 30, 1933.						

P = Panicum grass

S = Sudan grass



Experiment II

Cow No.	Breed	Age	'Days since' 'calving to' 9-28-33	Due to calve	'September 12, 17, 24 lbs. milk
<u>Lot A</u>					
52	H	10	183	--	32.1
71	H	7 $\frac{1}{2}$	147	5-8-34	28.0
96	G	5 $\frac{1}{2}$	80	--	24.1
Average		8	137		28.1
<u>Lot B</u>					
74	H	7	243	4-29-34	28.3
79	H	6 $\frac{1}{2}$	169	5-9-34	28.3
89	G	6	143	5-2-34	25.9
Average		6 $\frac{1}{2}$	188		27.8

H = Holstein

G = Guernsey

Feeding Schedule

Cow Number	Lot A			Lot B		
	52	71	96	74	79	89
<b>Inclusive days</b>						
1933						
Sept. 28 - Oct. 25	P	P	P	S	S	S
Oct. 26 - Nov. 22	S	S	S	P	P	P
Nov. 23 - Dec. 20	P	P	P	S	S	S
Dec. 21 - Returned to roughage fed previous to Sept. 28, 1933.						

P = Panicum grass

S = Sudan grass

Body Weights of Cows

All the cows in both experiments were weighed once each week on the same afternoon at about the same hour. The average weights for the different cows on the different roughages as well as the averages for the lots on the entire experiment for each roughage follow:



Cattle Weights in Pounds

Experiment I

Cow Number	Lot A			Lot B		
	88	109	113	104	105	111
Average weight on green Panicum grass	1240	920	893	965	1080	980
Average weight on green Sudan grass	1235	960	915	970	1075	988
Lot A - Average weight on green Panicum grass	--			1018	pounds	
Lot A - Average weight on green Sudan grass	--			1037	"	
Lot B - Average weight on green Panicum grass	--			1008	"	
Lot B - Average weight on green Sudan grass	--			1011	"	
Average weight, all cows on green Panicum grass	-	1013			"	
Average weight, all cows on green Sudan grass	-	1024			"	
Difference in weight in favor of Sudan grass	-	11			"	

Experiment II

Cow Number	Lot A			Lot B		
	52	71	96	74	79	89
Average weight on green Panicum grass	896	978	950	1163	877	960
Average weight on green Sudan grass	893	983	947	1180	885	955
Lot A - Average weight on green Panicum grass	--			941	pounds	
Lot A - Average weight on green Sudan grass	--			941	"	
Lot B - Average weight on green Panicum grass	--			1000	"	
Lot B - Average weight on green Sudan grass	--			1006	"	
Average weight, all cows on green Panicum grass	-	970			"	
Average weight, all cows on green Sudan grass	-	973			"	
Difference in weight in favor of green Sudan grass	-	3			"	

In both experiments the cows averaged slightly heavier on the Sudan grass but the average difference is so slight (only 7 pounds heavier for both experiments on the Sudan grass) that it probably has no significance.

the first time in the history of the world, the  
whole of the human race has been gathered  
together in one place, and that is the  
present meeting of the World's Fair.  
The great number of people here  
from all parts of the world,  
and the great variety of  
things exhibited,  
make it a most interesting  
and instructive meeting.  
The exhibits are  
of great interest,  
and the  
people are  
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kindly  
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Butter Fat Tests

Composite samples of four consecutive milkings were tested in duplicate every week with the following results:

Butter Fat Tests in Percent

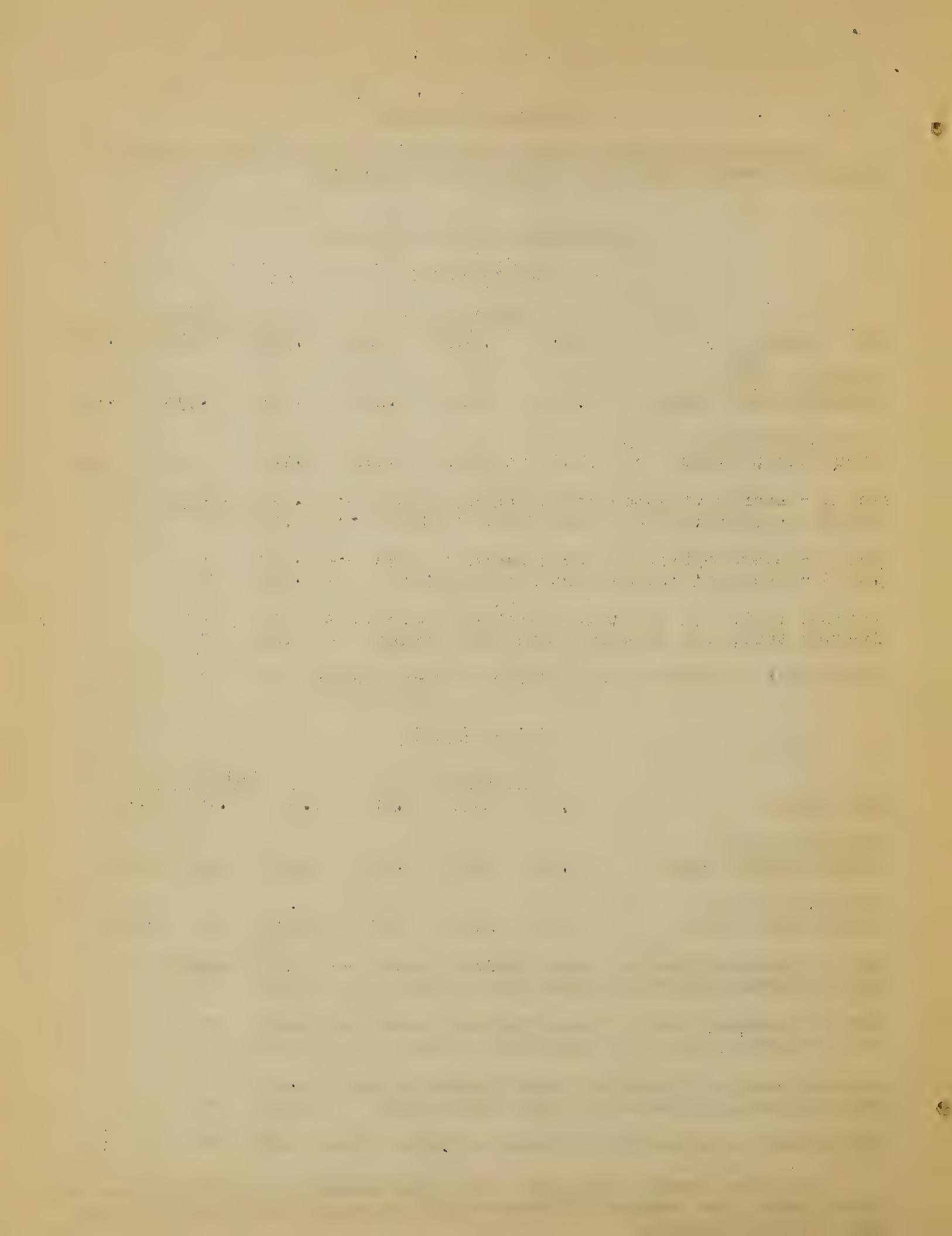
Experiment I

Cow Number	Lot A			Lot B		
	88	109	113	104	105	111
Average test on green Panicum grass	3.45	3.50	4.13	3.35	4.15	3.80
Average test on green Sudan grass	3.25	3.80	4.15	3.85	4.33	3.60
Lot A - Average test on green Panicum grass	--	3.69	percent			
Lot A - Average test on green Sudan grass	--	3.73	"			
Lot B - Average test on green Panicum grass	--	3.77	"			
Lot B - Average test on green Sudan grass	--	3.93	"			
Average test, all cows on green Panicum grass	-	3.73	"			
Average test, all cows on green Sudan grass	-	3.83	"			
Difference in butter fat in favor of Sudan grass	.10		"			

Experiment II

Cow Number	Lot A			Lot B		
	52	71	96	74	79	89
Average test on green Panicum grass	3.63	3.91	4.96	4.07	4.10	5.67
Average test on green Sudan grass	3.73	4.03	4.87	3.95	4.20	5.65
Lot A - Average test on green Panicum grass	--	4.17	percent			
Lot A - Average test on green Sudan grass	--	4.21	"			
Lot B - Average test on green Panicum grass	--	4.61	"			
Lot B - Average test on green Sudan grass	--	4.60	"			
Average test, all cows on green Panicum grass	-	4.39	"			
Average test, all cows on green Sudan grass	-	4.40	"			
Difference in butter fat in favor of Sudan grass	.01		"			

While the average test for both experiments is slightly higher on Sudan grass, the average difference (.06 percent) is so slight as to have no significance.



Milk Production, Quantity of Feeds Fed and Feed Costs

The following condensed table gives the most important data concerning average milk production, quantity of feeds consumed, costs, etc.

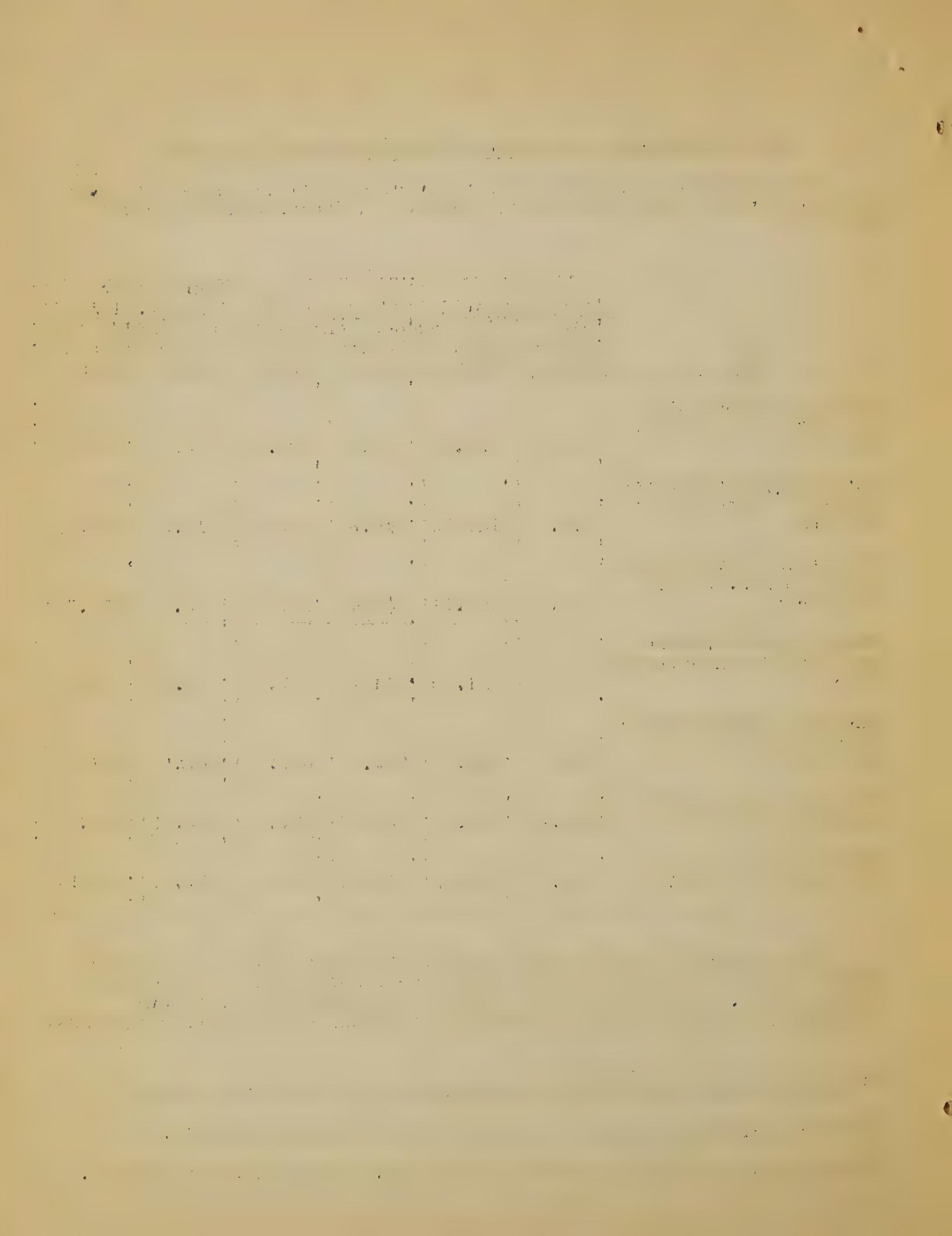
	Experiment I Cows on 'Panicum 'grass	Experiment II Cows on 'Sudan 'grass	Average of Expts. I & II 'Cows on 'Panicum 'grass
Average pounds milk produced per cow per day	18.57	20.43	22.05
Average pounds concentrates <sup>(1)</sup> fed per cow per day	12.07	12.00	14.62
Concentrate feed costs per 100 lbs. of milk produced	\$0.79	\$0.71	\$0.94 <sup>(2)</sup>
Pounds milk produced per pound concentrates fed	1.54	1.70	1.51
Average pounds roughage consumed per cow per day	41.9	48.1	57.2
Roughage cost per 100 pounds of milk <sup>(3)</sup>	\$0.68	\$0.71	\$0.78
Total feed cost per 100 pounds of milk	\$1.47	\$1.42	\$1.72

The preceding table shows that with the same quantity of concentrates the cows averaged about nine percent more milk when fed the Sudan grass. This was true not only of the average but of every individual cow in both experiments as is shown in the following tables.

(1) Beet pulp was included as a concentrate in these experiments.

(2) Feed prices were higher during the time of Experiment II.

(3) Both roughages were assumed to cost \$6.00 per ton (green basis).



Average Daily Milk Production in Pounds

Experiment I

Cow Number	<u>88</u>	<u>104</u>	<u>105</u>	<u>109</u>	<u>111</u>	<u>113</u>
On Panicum grass	22.17	19.14	21.00	17.75	18.79	12.53
On Sudan grass	24.57	19.82	21.43	20.29	19.89	16.50

Experiment II

Cow Number	<u>52</u>	<u>71</u>	<u>74</u>	<u>79</u>	<u>89</u>	<u>96</u>
On Panicum grass	21.86	20.62	23.57	24.19	20.81	21.24
On Sudan grass	24.52	24.52	25.40	24.45	21.81	23.71

More Sudan Grass Consumed

In both experiments the cows with an unlimited supply of each roughage available consumed more of the Sudan grass, averaging thirteen percent more for the two experiments. This would indicate a slightly higher value, pound for pound, for the Panicum grass, for with practically the same quantity of concentrates fed in each case it required 2.44 pounds of Panicum grass to produce a pound of milk and 2.53 pounds of Sudan grass.

The Panicum grass used, especially in the second experiment, was of excellent quality with practically none of the dry coarse stems often found in this grass when the fields are allowed to become too mature before cutting. It is possible that in pasturing Panicum grass, where cattle continuously feed on only the young tender shoots, the consumption of Panicum grass might be much higher than in these experiments.

Summary and Conclusions

1. In two experiments in which green Panicum grass was compared with green Sudan grass as roughages for dairy cows (both used as soil-ing crops) no significant difference resulted in either the weight of the cows or the butter fat content of their milk.

2. Milk production was about nine percent higher when the Sudan grass was fed. However, it must be added that Sudan grass when the roughages were used as soil-ing crops, as they were in this case, proved more palatable, the cows consuming an average of 56.2 pounds green Sudan per day as compared with only 49.5 pounds of the green Panicum grass.



3. When comparisons are based on the actual quantity of roughages consumed, Sudan grass was worth, pound for pound, only 96 percent as much as the Panicum grass. However, because of the greater palatability and consumption of the former, Sudan grass resulted in higher milk production.

4. Based on the results of these two experiments, it seems that if both green feeds are available in unlimited quantities, Sudan grass will give the better milk yields and should be used. However, the relative yields per acre and growing costs of these two roughages, which were not covered in the present experiments, become major considerations in this problem.

regarding the existing legislation in Great Britain concerning the use of  
air services. At this time, however, there was very little contact between  
existing countries and the members, so that no specific  
arrangements could be made for the insurance of civilian  
aviation.

After much discussion and debate, it was decided that no formal  
agreement should be concluded, since the various states were not yet in  
a position to accept the recommendations of the Conference. It was  
also agreed that the Conference should be held at Geneva, Switzerland,  
and that the proposed organization should be known as the International  
Air Transport Association.